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PROBLEMS AND PROSPECTS IN VOCATIONAL EDUCATION.

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THE CONTENTIONS EVIDENT IN RECENT DISCUSSIONS OF VOCATIONAL EDUCATION ARE CRITICALLY EXAMINED. PROGRAMS AT THE SECONDARY LEVEL ARE QUESTIONED BECAUSE OF THE TIME AND CONCENTRATED EFFORT REQUIRED FOR GENERAL EDUCATION AND THE NEED FOR A CONCENTRATION OF RESOURCES AND STAFF TO PROVIDE THE HIGH LEVEL OF TRAINING REQUIRED BY MODERN INDUSTRY. THE POST-SECONDARY SCHOOL IS IN A BETTER POSITION TO DO THIS. GENERAL EDUCATION MUST LAY THE GROUNDWORK FOR ALL HIGH-GRADE APPLICATIONS OF KNOWLEDGE BY PROVIDING RELIABLE REPLICATION OF CERTAIN SYMBOLIC SKILLS AND KEY FACTS, RELIABLE HABITS OF ACQUIRING AND USING KNOWLEDGE INTERPRETIVELY, AND A MASS OF LEARNINGS THAT WILL BE USED ASSOCIATIVELY TO ENRICH LIVES AND GIVE THEM INDIVIDUALITY TO SAFELY AND PRODUCTIVELY UTILIZE THE BENEFITS OF A LARGE-SCALE MACHINE INDUSTRY. NOT ONLY A HIGH ORDER OF VOCATIONAL SKILL IS NEEDED, BUT ALSO A HIGHER ORDER OF CITIZENSHIP AND PERSONAL DEVELOPMENT. AUTOMATION CAN PROVIDE THE ADDED PRODUCTIVITY TO MAINTAIN AND EXPLOIT A TECHNOLOGICALLY SOPHISTICATED CULTURE FOR FURTHER BENEFITS. VOCATIONAL EDUCATION HAS TO BECOME FORMAL AND MORE CONSCIOUSLY AND EXTENSIVELY BASED ON THEORY. VOCATIONAL STATESMEN SHOULD SIT ON THE BOARDS OF RESEARCH AND DEVELOPMENT IN EVERY MAJOR FIRM AND GOVERNMENTAL AGENCY TO SHAPE THE EDUCATIONAL STRATEGY. THERE SHOULD NOT BE A LAG OF 15 TO 20 YEARS BETWEEN THE MANPOWER NEEDS OF THE NATION AND EDUCATIONAL FACILITIES FOR MEETING THEM, BUT A LEAD TIME OF A DECADE. REBUTTALS BY STEPHENIE G. EDGERTON, JAMES E. GALLAGHER, AND JACOB STERN FOLLOW THE PAPER. (EM)

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Problems and Prospects in Vocational Education

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Problems and Prospects in Vocational Education

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A philosophy of vocational education is a set of arguments that justify some design of vocational education and justify it in terms of some theory. This theory is taken from one's convictions, preferably reasoned, about the nature and goal of life, about the nature of learning, and about the materials that a given society in a given epoch expects one to learn.

The bulk of this discourse, accordingly, will have to do with arguments and their justification rather than with pleas to the unenlightened opponents of vocational education on the one hand, or with soothing encouragements to the no less unenlightened proponents of it, on the other. The context of the discussion is the probable shape our society will take under the pressures of scientifically based technological development.

In the recent and current discussions of this topic one can detect at least the following contentions:

1. Because the economic life of the social order is important, everyone ought to be trained for economic productivity in the schools. This is regarded as especially important for the disadvantaged youth.

2. Failure in one's economic role causes or contributes to delinquency, hence vocational training in the schools is justified on sociological as well as economic grounds.

3. The social order by affixing prestige and material rewards to certain occupations prevents or discourages young people from choosing vocations realistically, hence a massive program of vocational and personal counseling is justified.

4. The high schools by their traditional allegiance to a literary, academic, bookish curriculum, have not given the proper attention to vocational training. Hence there should be a change, especially in the direction of secondary school vocational training for the academically limited pupil.

Let us consider some of the confusions that result when these contentions are not clearly distinguished. The economic life of the Eskimo, we can assume, is important to the Eskimo, and if the Eskimos did not teach the young the vocational skills of the tribe, there would soon be no Eskimos. This is a truism. The important point is that the necessary occupational training can be accomplished by imitation and apprenticeship. No one had to urge the Eskimo to undertake this type of education, for they did it anyhow. It was part of the milieu in which the young grew up. For one thing, almost everyone learned about the same occupational roles, although midwives and medicine men might be exceptions. For another, the tasks comprising a given occupational role were familiar, and the proper procedures could easily be demonstrated. These procedures could be formulated into rules, but the rules were not derived from theory and certainly not from scientific generalizations.

Presumably for all ordinary cases the existing procedures and rules would insure success. Extraordinary cases would present a problem. Whether or not the tribe could cope with them was a gamble, a gamble with luck and ingenuity or trial and error. The survival of the Eskimo is witness to the fact that either extraordinary cases were few and not important, or that their luck and ingenuity did not desert them. There is no evidence, at least none known to me, that the Eskimo applied the findings and methods of science to his economic problems. The know-how needed for the economic well-being of the group could be acquired and perfected without the benefit of formal

occupational schooling. The simple moral of this example is that the importance of economic activity does not of itself imply an argument for vocational schools, programs, or curricula any more than the importance of breathing and exercise necessarily justify schools of physical education.

If this distinction seems trivial, then call to mind how often advocates of vocational schooling have rested their arguments on the importance of the economic functions of the social order and then prescribed the kind of training that resembled that which the Eskimo and similar cultures have been giving informally for centuries. On the other hand, when the American social system is charged with neglecting vocational education, it is often forgotten that at the professional level, such schooling is not neglected at all. Obviously these critics are thinking of some of the other contentions mentioned earlier in this paper. They mean, one must suppose, a type of vocational training that is not professional, but which nevertheless cannot be picked up by merely living in the social order.

Nor is it helpful to mix up the need for facilities in vocational schooling that do not exist with the failure of young people to take advantage of the opportunities that do exist. Surely, these are different arguments and apply to quite different situations. In the first situation one is saying that James and Peter wish to become electronic technicians, but that regrettably they can find no course or no school in which to carry on the requisite studies. In the second situation, one may be scolding Susan and Mary for electing a classical course in high school when their abilities and station in life (as determined by scientific prognosis) point to the advisability of a business course. The answers to the problems of James and Peter lie within the educational wisdom and will of the community, but what is one to do with the alleged wrongheadedness of Susan and Mary?

For these reasons the strategy of justifying vocational education is less simple than it seems, and it may be profitable to specify the conditions that warrant new or improved programs of vocational schooling.

1. One must show that the proposed training requires formal instruction. The need for apprentice training not rooted in theory nor requiring theory for adequate performance, is not an argument for vocational schooling.* It is rather a plea to the Department of Labor to make suitable arrangements with industry and labor unions for apprenticeship opportunities.

   I hope that no one at this point will object that apprentices need instruction in language, mathematics, and history and that, therefore, the school must work out some combination of apprentice experience with academic instruction. Such objections are not cogent because: If the academic subjects are needed for citizenship or personal development, as well as for vocation, then they are part of general education and not the exclusive concern of vocational educators. If, on the other hand, the academic studies are needed to make apprenticeship effective, the training is no longer simple apprenticeship.

2. It is necessary to show that the economy clearly and insistently demands certain categories of formal vocational

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*Whether apprenticeship training is needed is another matter, and it is significant that even in England, a stronghold of apprenticeship, the Anglo-American Committee on Productivity recently recommended (without success) the shortening of apprenticeship from seven years to nine months and the increase of fundamental education.

training, that facilities are lacking to meet this demand or that they are rendered unavailable by virtue of high costs or unfortunate location. For example, our economy seems to demand personnel trained at a sophisticated technician level, but in some localities, at least, facilities for such training are scarce or non-existent. On the other hand, certain vocational training facilities may be in excess of the needs of the economy (agricultural).

3. One might show that certain occupations could be made more attractive by formal schooling. We have as yet done little to upgrade many of the service occupations for which there is adequate economic demand but which are now too low on the social scale to attract workers.

In one sense, this upgrading is not the responsibility of vocational education. The status of an occupation is the resultant of many factors. In another sense, however, the way a person is trained for a job has something to do with the status of the job in the occupational hierarchy, so this is a problem for vocational education.

I am not now thinking of the euphemisms by which grave diggers evolved into undertakers and subsequently into morticians and by which janitors are transmuted into custodial engineers. This is semantic abracadabra, but like all abracadabra, not without influence. More fundamental are the mechanisms by which an unpleasant but socially important task is made tolerable and honorable. Nursing, cleaning, disposal of the dead and of refuse, household and personal services of many sorts fall into this

category. There is a constantly high demand for such services, but they are unpleasant and tend to fall low on the social scale. But they are not all equally low. Nursing is a prime example of a calling that has risen on the social scale through technicalization.

For there is no task so distasteful that routine, skill, and a uniform cannot transform. The sweeper of dung is low on the occupational scale; the technician who examines feces in the laboratory is not. Skill, knowledge, standardized procedures justified by knowledge together with a uniform help to separate the unpleasantness of the task from the character of the performer, or to put it inelegantly, from rubbing off on him. For example, it is important that the performer of a personal service not be stigmatized as a body servant owing personal fealty to a master. Contrary to the common impression, depersonalization, not personalization, is the key to vocational respectability. The loyalty of the worker must be to the task, not to the person served. Even when an agency or firm boasts of providing personalized service, the personalization is so managed and routinized that it is depersonalized. The sleekly gracious airline stewardess is about as good an example as comes to mind. Any male traveler who construes her interest in him as personal is soon disillusioned. This may deflate the ego of the customer, but it does wonders for the ego of the worker.

Thus, although vocational educators cannot by simply taking thought, raise the social status of housework, practical nursing, gardening, and the like, they can, by taking thought, explore the possibilities of rationalizing, standardizing, depersonalizing, and insofar as possible, intellectualizing these occupations. I take it that such study is properly within the province of graduate students and research workers in vocational education.

Although there is no reason why vocational education should confine its concern to the lower end of the occupational scale, that is where the discussion usually hovers. The erstwhile rush to turn out more atomic scientists, solid state physicists, and computer engineers was not and is not, I believe, regarded as being the task of vocational education. The alleged failure of America to keep pace with Russian in these categories was thought of as a failure in general education rather than in vocational schooling. If I have spent so much time on the lower end of the occupational scale, it is partly because it is in the field of services that one can anticipate a large volume of jobs that will resist automation. Increased leisure and automation should increase the demand for service, and it is important that they be rescued from the category of the "last resort."

However, the main problem for vocational education concerns educational strategy in a more fundamental way. As the Western world (and we may as well anticipate a bit and say the whole world) works out the logic of mass production based on scientific technology to the end, bitter or otherwise, education for vocation becomes both more common and more general, on the one hand, and more specialized and diversified, on the other. This sounds paradoxical, but then we live in a paradoxical age.

To say that vocational education will become more diversified and specialized needs no elaboration. To say that it has to become more general and common means that it will depend increasingly on the manipulation of symbols as formulated in language, science, and mathematics. As someone has said, "It takes a ton of paper to make a ton of steel," and in such an industrial system symbolic workers are as important and may become as numerous as manual workers. The symbolic skills are at the heart of common general education.

The same conclusion is reached when the obsolescence of specific job training is considered. I have been told that in the years to come men will work only three days a week and they will put in two days a week on studying for a new job. So much for the dream of luxurious leisure. The flexibility implied by frequent retraining is impossible to achieve without a solid training in the symbolic skills and basic concepts that make up general education.

Finally, there is the educational fact that young people who have a mind to become technicians in any one of a dozen fields have to undertake post-secondary schooling that requires virtually the same competences in science, language, and mathematics as does the engineering curriculum. In summary, the prospect is for more and more specialization and diversification, but for many of these specialties to have a short life. Common general education alone will enable men to make the rapid adaptations to new processes, new materials, new forms of energy, and new forms of production.

At this point, I shall introduce a somewhat different but related set of considerations. If general education is, as I believe, to become a virtually universal requirement, what does vocational education add to it? Is vocational education different from general education in kind or in degree?

I have elsewhere discussed the various uses of knowledge or schooling. Here I shall concentrate on the difference between the applicative and interpretive uses only; I shall argue that the applicative use is distinctive of vocational education. I shall not argue that <u>all</u> interpretive uses (general education) are presupposed by any given applicative use. Hence, general education may well be <u>more</u> than is needed for a given occupational

competence and cannot be justified on that ground alone. On the other hand, the nature of the applicative use of schooling argues against trying to accomplish it in a school devoted to general education and precludes, I believe, the hope of getting general education through or by means of vocational education.

The Interpretive Use of Learning

You have heard it said that schooling is for understanding, not for parroting. Nobody, I suppose, disagrees with this, but what does one do (if anything) when he understands? I wish to distinguish, insofar as one can do so sensibly, between using knowledge applicatively and interpretively, and it is the interpretive use that I would want to identify primarily with understanding.

To understand something is, first of all, to identify it as belonging to a class or to a context that is already familiar. We say that a hurricane and tornado are both to be understood as cousins in the family of violent storms. It is doubtful that even the most common perception--seeing, hearing this or that--is wholly devoid of these classifying and ordering operations. This does not mean that there is no common world to be perceived nor that every perception is a subjective law unto itself, but it does mean that every time we are aware of anything we are aware also of what it is; if not, we are puzzled and troubled, and certainly we do not understand.

We interpret the impact of the world upon us and the stirrings within us through the use of meaning systems, categories, structures. These are all names given to the frames of experience. Experience is ordered in

frames of space, time, conservation of substance, reversibility of operations, and the more developed systems of meaning we call sciences and the humanities--the intellectual disciplines. [(The "rediscovery" of the work of Jean Piaget on the development of these acts of ordering is witness to both the importance of the interpretive component in learning and the historical naivete of our educational psychologists or, what is more likely, their preoccupation with the kind of knowledge use that is fashionable at any given time.)]

They are disciplines because they are systems of controlled thinking and meaning. They are systematic ways of sorting our experiences and for resorting them.

Suppose we are asked to understand the war in South Vietnam. It means, among other things, that we can:

1. locate the scene of the conflict on a map
2. recount the series of major events that led up to the war
3. name the alleged goals of the parties to the conflict
4. talk about the troops, the battles
5. tal k about the diplomatic maneuvers

In summary, a rough but practical test for understanding is the kind of behavior we call talking, discussing, and reading about the South Vietnamese situation.

Note, if you please, that to understand the war does not entail doing something to change it. Action on X is not a necessary condition for understanding it. Knowledge <u>is</u>. Think of the variety of learnings commandeered by the task of understanding this event! It is almost as if our mind possessed a number of maps drawn in different projections, and we

located our war on each of these. The maps oriented us toward X by giving us the measure or location of X in the space, time, political, psychological dimension.

Or, if you prefer another metaphor, think of having acquired in one's lifetime (and schooling) a batch of stencils, each with its own design. Suppose we put these stencils onto our war, one after another. Each time we do so, the war will be seen through a different design, and what shows through will make a political, historical, military picture, but colored in the hues of the South Vietnamese war and not of something else.

I suppose the point is that although the exact details of the understanding act are not clear, we can identify some of the learnings we think <u>with</u> or understand with. Among them are the school subjects--all of them. The more general and extensive our schooling has been, the greater the number of maps, nets, languages, conceptual schema, stencils, etc., at our disposal. In short, we understand X or interpret X when we can describe (a) the system of meanings in which it is embedded, and (b) when we discern the position of X in this system, i.e., when we can relate it to other elements of the system.

Now it does sound as if all interpretation is merely intellectual, but some of it is an enlightened cherishing. Just as we pass all experience through our cognitive filters so do we interpret all experience by our values, tastes, and norms. Everything is colored by the dyes of our desires and aversions; our aspirations and ideals. The refinement of evaluative filters or maps is the goal of the arts and humanities.

Cognitive interpretation and valuative interpretation go together; our desires direct our knowings and our knowings shape our desires, but they are

not identical, and neither are the learnings which the school has to provide for each. Just as without assiduous study of the sciences, our cognitive interpretation is crude and inept, so without devotion to the arts our feelings are lumpy, stereotyped, and tiresome. To be sure, our culture does not lack distractions and amusements suitable to such taste. While today the public, and therefore, the school, cannot tolerate low-grade cognition, it can and does tolerate low-grade appreciation. This is not surprising. What is surprising is our surprise to discover that much of what money can buy is not worth having, and that affluence and riches are not the same thing. Our current success routes seemingly have some potholes that need attention. The Johnson administration has made this diagnosis official by the establishment of the Humanities and Arts Foundation and by the admirable efforts at environmental de-uglification by Lady Bird.

To understand, according to a venerable tradition, is the highest function of man. Our doings are witnesses to our imperfections (or sins); a perfect fit of man and world would require of him nothing more than to contemplate his perfection. But man being imperfect has to change himself and the world to achieve an even tolerable fit. So he works and struggles to adjust and stay alive to adjust some more. Yet he can lighten the burden by thought, by applying knowledge to his task of endless adjustment. And so the applicative use of knowledge is prized in Western culture above all others. The applicative use ranges from the use of knowledge to guide action in ordinary daily tasks to the use of abstruse scientific theory in order to make all sorts of machines.

Applicative Use of Learning or Knowledge

Today, of course, the scientist and his technological troops are the critical factors in industry, health, war and peace. Scientific technologists are the culture heroes of our time. (Some have called them the new priesthood, but this, I have been given to understand, they do not like because it cramps their style of life unduly.)

It is also to be expected that curriculum time and school resources would be devoted to studies that could be "applied," and that schooling would be evaluated in terms of its being applicable.

This sort of justification is quite natural for vocational education. For vocational education that cannot be applied to earning a living is an odd sort of vocational education. But when this criterion is insisted upon for all schooling and especially general education, much mischief is done.

Suppose one were to ask what it means to "apply" knowledge to the Vietnamese situation.

1. Surely one would expect more than the understanding described under the interpretive use. Some people would want something like this:

> We want victory in Vietnam to: drive out the Vietcong or persuade them to leave; turn South Vietnam into a viable democratically disposed country such as Holland, or perhaps Texas.

Now we know what is needed: lots of goods and services and we know how to produce these. We also know how to fight wars. It is the how-to knowledge that is the key to our question. For how-to knowledge is a knowledge of technique, and when techniques themselves are based on knowledge, this how-to knowledge becomes technology.

To apply knowledge one needs a device that translates knowledge to a prescription for action on particular situations, i.e., rules and

procedures. There is, as we all know, a technology of war and industry and business. In every case, ways of doing things with appropriate instruments is what is meant. Even where one wants to apply knowledge of chemistry to removing stains from tablecloths one needs some device to put the stuff on.

You may object that someone could figure out how to do something in his head. True, but what would he have in his head if he did? Would it not be an idea about a set of steps to be followed or of devices to be used? To have applicable knowledge does not mean carrying out the process, but it does mean having in mind a carrying-out process.*

The difference between interpretive and applicative use is supported by the fact that inventors are not always, or even generally, the same men who discover the knowledge to be applied. Edison was not the discoverer of the principles of electricity.

There is also a difference between understanding a technology and using such knowledge applicatively. I can understand how a carburetor functions in an automobile, but I do not know how to install one, repair one, or judge what is wrong with it. The familiarity with the appearance, construction, and norms of carburetors does not follow from (because it is not contained in) the knowledge of the principles of combustion or even in the principles of carburetor construction.

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*Just where to insist on overt action in the applicative use of knowledge is not clear. Obviously a physicist who uses physics to think up a rule of engineering practice, the engineer who designs the bridge, and the worker who builds the bridge may all be applying knowledge. Yet it is clear that each is operating at a different level of concreteness. We may say, therefore, that to apply knowledge K is to prescribe a set of rules and procedures for a domain of objects not directly or explicitly included in the domain of K, yet which can be subsumed under the principles of K.

Finally, there is the practice itself of messing around with carburetors--the skill of messing around with them efficiently--what we might call technical skill.

I think the conclusions of this paper are fairly clear. General education which is to function most widely is that which provides (a) reliable replication of certain symbolic skills, key facts, and (b) reliable habits of acquiring and using knowledge interpretively, and (c) a mass of learnings that will be used associatively to enrich our lives and to give them individuality.

Applicative knowledge refers to our specialized role in life, and each one of us sooner or later must acquire and use it. Nothing that I have said should be understood as denigrating it. Our specialty is also part of our individuality, and all of the world's work uses knowledge applicatively if it uses it at all.

General education, if it is successful, lays the necessary groundwork for all high-grade applicative uses of knowledge, because all uses of knowledge are in some sense interpretive just as they are replicative and associative.

Yet each use of knowledge is tested in a somewhat distinctive way, and there is reason to believe that the way each is to be taught is also distinctive. Hence, there is the danger of much confusion, misunderstanding, and waste of effort if these differences are ignored in the strategy of making the curriculum and the tactics of instruction. The enterprise we call education is difficult enough, complex enough, important enough that we should spare it whatever confusion our efforts at clarification can avoid.

If these considerations have any merit, then certain changes in the general school system seem to be indicated:

The secondary school as the proper place for vocational education may be seriously questioned. First, it is doubtful that the ordinary secondary school can provide a program that will be adequate to both the increased diversity of occupations and the greater commonality of the general education that is a prerequisite for them.

The reasons for this doubt are fairly simple. A sound education in the general studies takes time and concentrated effort. For those who admire European secondary education it should be noted that even with a highly selected student body, gymnasia, lycées, and public schools do little else than teach the basic studies. If basic education is to be done thoroughly, the secondary school cannot do anything else, not even vocational training.

The other reason is that in order to provide the high level of training required by modern industry, for a wide variety of specialties, one needs a concentration of resources and staff that very few secondary schools can command. In short, what America has tried to do with its comprehensive high school will probably have to be done by a chain of regional post-secondary institutes devoted exclusively to vocational training in both depth and breadth.

Presumably, such institutes would supply training for the occupations up to the professions, although the possibility of transfer into professional curricula from the institutes need not be precluded. Relieved of the need to provide general secondary education, these institutes could utilize their resources for high quality specialized vocational training; relieved of the need to dabble in vocational training, the secondary schools could, in turn, make it unnecessary for vocational schools to give remedial work in

language, science, and mathematics. I have used the word "dabble" advertantly because most American secondary schools confine their vocational offerings to the commercial courses and a little training in one of the trades or agriculture. Most American secondary schools are too small to do otherwise.

It will be objected that this division of labor is unrealistic and even wasteful. Youngsters who are unhappy with book work, it is argued, should begin vocational training early, say at the age of 14 or 15; any further time spent on general studies would not only be a waste of time, but might even even drive them out of school.

Against this objection certain observations are in order: First, that among dropouts from high school one finds all grades of intelligence, not simply the dullards. In the second place, if the lower occupations are to be made more desirable, they too will require higher competence in language, mathematics, and science. Third, we have not yet exhausted the pedagogical means for teaching the general studies to the lower reaches of intelligence. Fourthly, the problem of rescuing children who have been radically deformed by their environment is a problem for social therapy, and the responsibility for it rests primarily (not exclusively) on the Department of Welfare rather than on vocational educators.

Finally, and most important, there is the fact that to utilize the benefits of large scale machine industry safely and productively we need not only a high order of vocational skill, but also a high order of citizenship and personal development. Without these the effects of automation may be disastrous, not only economically but socially and psychologically as well. Contrary to first impressions, the ultimate development of mass production is not a maximum of mediocre uniformity. It is rather

the volume production of an array of products exhibiting the widest possible diversity. The trick of mass production is not to turn out cheap suits in three colors and four sizes. That is only the first step. Technology comes into its own when without raising unit costs it can turn out suits in 25 colors and 20 sizes. Without the sensitive as well as voracious consumer the high productivity of technological progress cannot be accelerated sufficiently to escape the drag of overproduction.

All of these considerations militate against the argument that general education is for the classes and vocational education is for the masses. One of the fortunate factors in the situation is that automation technology can provide the time and resources for the new educational formula. We can use the added productivity of a technologically sophisticated culture to maintain and exploit it for further benefits.

If this view is correct, vocational education for the immediate future is important in more than a truistic sense. It is important in the sense that it has to become formal and more consciously and extensively based on theory. The elaboration of knowledge in interdisciplinary form may well have a profound effect on the patterns of vocational training. Solid state physics, biochemistry, and a host of other fields make the preparation of an electronic technician, for example, far more complicated than it used to be. Working in automated factories will, no doubt, create occupational patterns of its own. The service occupations also will call for theoretical scrutiny and rethinking.

This, in turn, means that vocational education is itself a field of study and research. I do not wish to denigrate the teacher of vocational subjects who combines industrial experience with a willingness to teach;

there will never be enough of them. But automation, space exploration, and atomic power have affected a radical, nor a gradual, change in human life. Like all highly refined mechanisms, the new social order has great potentiality, but is so delicately balanced, so intricately intermeshed that it can go wrong in many ways and any one of them may be fatal.

Somewhere in our complicated system must be men who not only know how to teach auto mechanics, electronics, or agriculture, but who have a cognitive map, so to speak, of the whole economy and of the whole social order. For it is doubtful that we can ever again afford lags of 15 or 20 years between the manpower needs of the nation and the educational faciilities for meeting them. On the contrary, to stay even, educational strategy should have a lead time of at least a decade.

In a culture such as that of the United States where economic planning on a national level is not looked upon with favor (although no industrial organization would be caught dead without its plans for the future), it is difficult to project manpower needs and to translate these into educational activities.

What sort of training would it take to produce a cadre of vocational educators who could do this sort of planning; who could interpret pervasive trends in the work patterns of our culture; who could understand the impact of new discoveries and processes for the economic future? For the good of the nation , industry, and the world itself, such vocational statesmen should be sitting on boards of research and development in every major firm and governmental agency. Right now there may be possibilities aborning that ought to be translated into educational designs, a task that

neither the industrialist nor the researcher, nor the government official is trained to do.

It is for this reason that as the professional level vocational educators need foundational study, i.e., in the philosophical, psychological, historical, and sociological materials that bear on problems of educational policy, curriculum design, organization and support, and teaching-learning as well as technical training. The phrase "professional level" is a calculated qualification. Workers in the field who think of themselves solely as technicians perhaps can dispense with such studies. Given familiarity with the processes to be taught and some teaching skill, they can do their job without losing sleep over the vagaries of the culture. They are, in a sense, not very different from the boys and girls they are teaching, for it is a case of an experienced technician teaching a novice technician. Such men are valuable and indeed indispensable. Vocational education is happy to lure some of them away from industry for pedagogical purposes. However, such men will no more be able to shape educational strategy than will sergeants in the army or foremen in the factory. If it takes a ton of paperwork to make a ton of steel, it will take more and more knowledge about the world to understand the world of work, and it will take even more if educators aspire to anything more than catching up with the dynamics of economic change. We are, all of us, therefore, condemned to develop our powers of knowledge and wisdom to a degree hitherto believed to be impossible for the common man. Strange as it may seem, it is the machine that may in the last act force us to become human.

Philosophies of Applied Science and Vocational Education*

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I must confess at the outset of this response that I find Professor Broudy's paper difficult to understand. His problems and prospects, arguments and biases appear to me both confused and confusing. After a number of readings of the Broudy paper, I was led to ask whether Broudy assisted vocational educators in <u>understanding</u> their problems and considering their solutions.

I take it that vocational educators like "all other workers" apply knowledge and that Broudy like "all other workers" was applying knowledge in order to solve problems of education for vocation. If I <u>understand</u> Broudy's thesis, his common and general education has allowed him to gain a cognitive map which in turn his vocational education has given him an opportunity to apply. The Broudy application of knowledge seems to have led to the thesis that the problems of vocational education, the difficulties surrounding the paradoxical situation in which education for vocation has become both more common and more general while at the same time more specialized and diversified, may be solved through post-secordary schooling which draws upon common and general elementary and secondary schooling. Part, then, of applying knowledge has become in the case of Broudy <u>understanding</u> the problem, a process he attributes to the interpretive use of knowledge--a cognitive skill acquired through common and general education. This suggests Professor Broudy's viewpoint on the occupation labeled "philosophy" and

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*The major influences on this paper are the studies of Sir Karl R. Popper in methodology and social philosophy, the studies of Joseph Agassi in the philosophy of pure and applied science, and the studies of Berenice M. Fisher in the sociology and history of industrial education. Professor Fisher contributed many informative details during several long discussions and made helpful comments on an earlier draft. Professor Agassi was especially helpful in a discussion on the problems of this paper.

the vocational education requisite to its practice. Indeed, since my confession is on record, it says something about my "vocational education." But enough philosophic frivolity.

Since the time alloted me is brief and my comments extensive, I would like to turn immediately to the point I consider most significant in Broudy's paper, the point most seriously in need of discussion: WHAT, IF ANY, IS THE ROLE OF THEORETICAL KNOWLEDGE IN VOCATIONAL EDUCATION? I believe Professor Broudy has suggested that "theory" plays a major role in the training of vocational statesmen, the training of vocational educators, the training of boys and girls vocational educators educate, and, as a matter fact, in the training of all workers in a highly complex and industrial society. Like most "truths" this is a half-truth, which means, if one is not a Hegelian, that it is false.

One example strikes me as enough to refute the Broudy thesis and at the same time to indicate the need for clarification. The classic case of vocational training based on a theory, a theory which is not taught to the trainees, a theory incidentally which is false, is navigation. A brief glance at textbooks from naval academies indicates that information passed out to the students is based on Newtonian theory, a theory which students are not taught but which forms the basis for their occupational endeavors for years to come. This being the case, Professor Broudy has inherited an interesting problem.

If practice is based on theory, theory to be taught youngsters in their general education, (since I take it that according to Broudy there is a need for theory and not enough time to distribute it) and vocational education which follows general education will benefit at least in part by this training, then my example seems to eliminate at least in part, the need for a common and general education aimed at vocational education.

Furthermore, I would suppose that my example suggests that under the Broudy plan there would be a need for the distribution of false theories.

Now I am aware that Professor Broudy has indicated the need for general education to teach the skills of reading, writing, and mathematics--skills necessary for naval trainees to read their texts and understand their teachers. (Given the current teaching fashion, I would not hesitate to add the skill of "listening.") I am aware, also, that Broudy has pointed out the need for general education to assist in the development of good citizenship and personal enrichment. But, what concerns me in the Broudy approach to vocational education, as no doubt you have already guessed, is the lack of clarity concerning that dimension of general education which apparently aims at <u>understanding</u> and which becomes "useful" upon entrance to a post-secondary vocational school. "That part" I take to be some form of theoretical knowledge.

I surmise that Professor Broudy's theories concerning general and vocational education are based upon "a model of applied science," that is, the relationship of interpretive knowledge to applicative knowledge is thought of as the relationship between science and applied science. The conjecture only grows in strength when I review Broudy's vocational education arguments which reflect the rhetoric of those people interested in vocational education who espouse the viewpoint that vocational education should follow the pattern of engineering, i.e., vocational educators who would teach their trainees the broad principles or theories upon which to operate in their occupation as opposed to the specific techniques of a trade.

Clearly, Professor Broudy has performed a valuable service to vocational educators in talking the way he has, as well as to philosophers of education: for, in raising in a vague form the thorny but interesting question of the relationship of science to applied science he has plotted the general area

in need of philosophic cultivation which accompanies the arguments of those vocational educators who opt for a form of curriculum resembling engineering. At the same time, Professor Broudy has in his failure to distinguish between the several groups of those interested in vocational education muddied the arguments of his paper but indicated the need for historical-sociological investigation into vocational education. Thankfully, this latter study has begun and I shall comment on it shortly.

Let me explore for a moment the model of applied science. Here, I think, we must admit at the outset that the relationship between science and applied science is as yet largely an uncharted continent. The studies of Sir Karl Popper[1] and his students as well as the work of Thomas Kuhn[2] point to numerous difficulties regarding methodological procedures in scientific activities. The discussion to date of applied science leads me to cast the matter in the following manner: The task of applied science appears to be an examination of the scope of theories, a study of the boundaries within which a theory operates. When testing occurs, the applied scientist is attempting to ascertain the amount of risk or safety in the use of products. Falsification is of little interest to him. He is striving to investigate where a theory applies, not that it does not apply. Applied scientists, then, are content to explain within a given theoretical framework, a framework developed by the pure scientist. Presumably, on rare occasions the applied scientist contributes to pure science when he strikes the boundaries of the framework indicating the direction in which a pure scientist may move to improve the existing theoretical framework. It might be added that the existing framework is relatively vague.[3]

An analysis of the relationship of science to applied science seems to me to be significant to our understanding of the place of theoretical

knowledge in education. Perhaps, the formulation I have proposed is in error; however, it has served to call my attention to several difficulties in the Broudy paper, difficulties which I think indicate the need for further thought about theoretical knowledge and its application.

One of the difficulties which I think I have raised apropos the Broudy approach is the notion of teaching youngsters in general education the "latest" theoretical knowledge in the sciences, social sciences, mathematics, etc., intending it should form the basis of application in vocational training. Unfortunately, perhaps, for the generally educated youngsters, who will someday attend a post-secondary vocational school, they may have gained an understanding of the social and physical world but have acquired theories which approximate the truth rather than those theories useful in applied science. As I previously mentioned, applied science frequently operates on the basis of false theories.

A second and, perhaps, more important problem is: <u>Who will make the translation of theoretical knowledge into principles of action or process?</u> The "how-to" techniques to which Broudy refers appear in his proposal to be developed in post-secondary schools by children. Or will the teachers of these students develop the principles? What <u>vocational</u> education is necessary to acquire this expertise? And in what occupations will this expertise reside?

I suppose that most applied science takes place in circles of highly trained professional personnel. The education of this personnel I gather Professor Broudy thinks falls outside the province of vocational education; or, at least, he thinks vocational educators have forgotten it, are unaware of this type of vocational training, or lack an interest in it. I suspect that no group is more interested in it and with good reason.

Recent studies of the chemical profession seem to indicate that more and more chemists are trained by university professors for industry and government.[4] As this new set of career patterns emerges for chemists, not only is the standard of study in chemistry lowered, but certification of the workers in the chemical industry is placed more and more in the hands of those attempting to vocationally educate the technicians or what have been called "bench chemists." One might perceive the professionalization of scientists as a threat to those interested in vocational education who espouse the viewpoint that vocational education stress broad principles or theories. Presumably large industry has not only the financial capacity to vocationally educate its own technicians in specialties where the need arises but has emerging within its institutional structure a group of workers who may control the certification of their assistants.

Now you recall I suggested earlier that Professor Broudy's arguments were confusing because he failed to distinguish between the several groups of vocational educators. The studies of Berenice M. Fisher have called to my attention the need to look at vocational educators not as a group but as many groups.[5] Fisher's work indicates that besides the group of vocational educators we have been discussing there are at least two others. There are those vocational educators who focus on the poor, the delinquent, the derelict, urging vocational education for social reform and there are those vocational educators interested in the average American boy who argue for training in trades to equip young members of our society for occupational niches, frequently emphasizing the importance of craftsmanship.

If one reviews Professor Broudy's paper with a sociological microscope focused on his rhetoric, one recognizes immediately that he incorporates arguments from each of the groups mentioned although he is largely a spokesman for the group who emphasize curricula based on principles or theories.

I am not convinced that Broudy assists vocational educators in clarifying their difficulties when he shifts his rhetoric from the framework of one group to another. Does he not assist vocational educators in talking past one another? Could one say that Professor Broudy in relegating students with little ability to therapists, while at the same time advocating theoretically oriented training for service occupations embraced the worst of two worlds, solving none of the problems that either of the groups enunciates? Perhaps, there is a kernel of truth in the problems and solutions offered by each of the groups. However, when Broudy argues from one standpoint attempting to solve the problems of all standpoints, he is forced to prescribe solutions to situational problems which appear unacceptable. For instance, he is compelled to take the problem of poverty out of the public school setting because theoretical education (perhaps rightly) doesn't seem relevant.

Fisher's distinctions no doubt may be improved upon. However, my point concerns the refinement of our view of the problems of vocational education through a knowledge of the situation. Part of the situation would appear to be a rhetorical conflict among those interested in vocational education. Historically, the groups identified seem to have argued their cases in substantially the same form as is argued today. Improvement would seem to lie in articulation and recognition of the conflict. Clearly, there is little to be accomplished by the repetition of the arguments for another thirty years.

The lesson one may learn from the studies of Fisher, Strauss, and others is the need for more investigation into the problems of vocational education. Little has been done. But enough has been done to satisfy at least me that what is needed is study regarding the sociology of groups involved in vocational education, study regarding career patterns in various

industries as well as government, and especially critical histories of the problems as they have been formulated and the solutions which have been offered and attempted. Vocational educators like other educators might well profit from critical-scientific-historical studies of their endeavors.

A philosophical contribution to the problem of vocational education may well follow the pattern I have proposed in this response. That is, building on the suggestions of Professor Broudy, I have attempted to formulate the philosophical problem involved in the viewpoint of those vocational educators who espouse a principles approach. Undoubtedly there are philosophical problems hiding in the viewpoints of the other groups. Critical discussion of the philosophical aspects of vocational education seems to me an avenue of improvement.

From my standpoint we come to <u>understand</u> our problems by offering solutions, by critically working on our problems, reformulating them through our recognition of our failed attempts at solutions. This, of course, is but another way of saying "that we learn by our mistakes."[6]

FOOTNOTES

1. Karl R. Popper, The Logic of Scientific Discovery (New York: Basic Books, 1959); Conjectures and Refutations, The Growth of Scientific Knowledge (New York and London: Basic Books, 1962, esp. pp. 111-119).

2. Thomas S. Kuhn, The Structure of Scientific Revolutions, International Encyclopedia of Unified Science, (Chicago: University of Chicago Press, 1962); "The Essential Tension: Tradition and Innovation in Scientific Research," Research Conference on the Identification of Creative Scientific Talent, edited by Calvin W. Taylor (Salt Lake City, 1959).

3. Joseph Agassi, "Verification in Pure and Applied Science," paper given to the Philosophy Colloquium (Urbana, 1964).

4. Anselm L. Strauss and Lee Rainwater, The Professional Scientist, A Study of American Chemists (Chicago: Aldine Publishing Co., 1962).

5. I have borrowed freely from the work of Professor Fisher, consequently I may have misinterpreted her efforts at times. Any such mistakes, of course, are mine. Among her writings are the following: Berenice M. Fisher, "Public Education and 'Special Interest': An Example from the History of Mechanical Engineering," History of Education Quarterly, Spring, 1966; "Patterns and Problems in the Relation of Education to Philanthropy," Teachers College Record, forthcoming; "Education, Mechanization, and American Agriculture," paper presented to the Midwest Conference of the Comparative Education Society, Madison, 1966; Industrial Education in the United States, unpublished doctoral dissertation, University of California, Berkeley, 1965.

6. This, of course, is the theme of the work of Sir Karl R. Popper.

Comments on Professor Broudy's "Problems and Prospects in Vocational Education"

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The paper pertaining to the philosophical aspects of curriculum evaluation prepared by Professor Broudy is an illustration of what we in vocational education have come to expect from him. His discussion of the very core of the issue in vocational education today forces us to question the basic premises and postulates which we have accepted and tend to take for granted. His arguments are clear--not clouded by semantic exercises and diversions common in philosophical writings--and I thank him for this. Professor Broudy's position requires little elaboration by a respondent.

Most of us avoid, or at best reluctantly question, an examination of the postulates of vocational education, and for good reason. It is not a comforting situation for us to examine the areas of our personal specialization, when a possible outcome of such an examination might indicate that we shouldn't be doing that which we know best how to do.

Professor Broudy tells us that we "dabble in vocational training" at the secondary school level. "Dabble" does not ring pleasantly in our ears, but we have had worse things said about us, and we have always responded to the critics.

Our responses have taken various forms. That is to say, in some instances we have responded by "improving" the selection process of students, thereby raising the entrance requirements for particular courses, or we have responded by "updating" a particular curriculum (aircraft mechanics spend less time learning how to build a wood rib or patch a fabric skin in

today's world of jet aircraft), or we've responded by raising the requirements for teacher certification, or we've responded by purchasing new equipment, or perhaps by even adding a new area of vocational training to the school curriculum (such as hydraulics or industrial instrumentation). And our responses, while perhaps not satisfying the critics, have generally pacified them. I think that the majority of us here today would agree with Professor Broudy when he states that we "dabble in vocational training." But while agreeing, we remain somewhat removed from the criticism, for we have found a new mode of response.

The Vocational Education Act of 1963 has provided us with this new mode of response. We can now do "sophisticated research" while spending approximately twenty million dollars a year from federal funds. There is no need to dwell on the time, effort and gamesmanship of proposal writing with you, but perhaps there is need to look at the kinds of research being done in the process of spending such an impressive sum of money.

A review of the research topics funded under Section 4c of the Vocational Education Act of 1963 from the date it was passed until September 1966, presents the following facts:

1. The percentage of projects funded for conferences was about equal to the combined percentage of projects funded for research on unemployed persons, comparative education, youthful offenders, slow learners, mentally retarded, and older workers (N=190, 7.9%, 7.7%),
2. The area of vocational guidance accounted for 21.6% of the total projects funded,
3. Trade and industrial subject areas accounted for 11.0% of the total projects funded. This includes drafting, machine shop, automotive

mechanics, aviation mechanics, printing trades, electronic technology, electro-mechanical technology, fluid power, bio-medical, animal sciences, library technicians, jobs in government (one project each), industrial instrumentation (two projects each), medical (four projects each), and facilities (three projects each).

4. There is a great diversity of topics funded under Section 4c of the Act. The funded projects certainly are not narrow in their approach to the problems of vocational education,
5. Considerable attention is being given by researchers to the problems of the teacher (methods, upgrading, etc.) and of the school (primarily curriculum),
6. Relatively little effort is being expended by researchers to determine the characteristics of the learner, and of the nature and characteristics of occupations,
7. There is little evidence of attempts by researchers to do a synthesis of information available on the learner, the teacher, the school and the occupation. That is, information available and research currently underway continues to remain as isolated bits. With the establishment of research coordinating units throughout the United States, attempts to remedy this situation are underway.

Caution must be exercised in the conclusions of an analysis of research topics such as that made by this writer. Not reflected in this analysis is research in vocational education initiated and funded by state governments, universities, private agencies and individuals. With delimitations such as this, however, it is probably accurate to state that the kinds of

research currently being conducted under federal grants is illustrative of the topics that individual researchers consider to be the problems of vocational education today. At any rate, current research reflects the problems that vocational education researchers believe are important.

If this is the situation, then, Professor Broudy could have said that not only do we "dabble in vocational training," but that we also "dabble in vocational education research." Our newly found mode of response to the critics, when it is subjected to critical examination, is of questionable improvement over our previous modes of response, for an examination of current research in vocational education reveals, if nothing else, a complete lack of coherence or direction.

But the speaker's reference to "dabbling" is of secondary significance to his paper, and there is no merit in dwelling on it further.

Having stated his arguments and their justification, Professor Broudy *presents us with what (to me at least) is the key issue for our considera-* tion, and to which the remainder of this paper is directed:

> The secondary school as the proper place for vocational education may be seriously questioned.

The speaker gives two reasons for this doubt:

1. If basic education is to be done thoroughly, the secondary school cannot do anything else, not even vocational training, and
2. In order to provide the high level of training required by modern industry, for a wide variety of specialties, one needs a concentration of resources and staff that very few secondary schools can command.

The thought of eliminating vocational training from the secondary school curriculum, is a question we have avoided. For some, it is a painful question for it has far reaching ramifications, hitting at our raison d'être. Nevertheless, let's examine the issue, the justifications for starting it, and in the process, conduct a general appraisal or evaluation of the vocational training programs at the secondary school level.

This examination will be conducted within the framework provided by Professor Broudy, and with which few of us would disagree. That is, we generally accept the assumptions of more specialization and diversification of occupations, delayed entry into the labour force, increased educational attainment needed for today's occupations, frequent retraining of the labor force, increased technological development, increased productivity, and so on.

The task of evaluating vocational education programs is not an easy one. How can it be done? Do we see ourselves as decision makers or as data collectors?

In the past we have evaluated programs in various ways and with varying degrees of success. We have generally used the following methods, either singly or in combinations.

1. Number of students enrolled in the program--in relation to the total educational enterprise, the number of students enrolled in vocational training programs at the secondary school level is considerably less than the numbers of students enrolled in other programs offered by the schools.
2. Student retention power of the program--a frequent measure of the success of a program in the secondary schools is the number of

students who continue in a two or three year program. Perhaps an equally valid measurement would be the number of students who elect not to continue in the program as a result of their experiences.

3. Parental support of the program--again, in relation to the total educational enterprise, the number of parents actively supporting the program (if parental counselling of their children into the program is a valid measure) is small.
4. Expenditures on the program--some interpret large budgets for vocational training as a measure of success, whereas other educators equate success with low expenditures. We can manipulate this method to serve our purposes.
5. Student placement in jobs--this is by far the most widely used method of program evaluation in vocational education. The statement is often heard that "100% of my students were placed in jobs." But when it is remembered that vocational educators begin with an extremely small N and that only one-third of the students enter jobs for which they have been trained and that of these two-thirds change occupations within three years, the numbers involved in the "100% are low indeed.

Even the most lenient interpretation of the results of past methods of vocational education program evaluation at the secondary school level is not an enviable one.

There is another method which we use to justify our vocational education programs at the secondary school level, and while it is not a method of evaluation, it deserves comment. In response to industry's and government's

pleas for improved manpower resources, vocational educators assert that programs at the secondary school level are, in fact, attempts to meet those demands. It would follow logically, then, that industry would give preference to (however slight) graduates of vocational education programs. If statements from the corporate training directors of United Airlines, Bell Telephone and Brunswick Corporation are representative of big employers in the United States, no preference is given to vocational guidance. More often than not, equal preference is not given to graduates of vocational programs. There is no question that industry uses the selection process inherent in the secondary school system as a device in recruiting employees, and in general, industry selects the student who has not taken a vocational program. Industrial employers may not be able to tell educators specific qualities or attributes they look for in prospective employees, but by their actions, they tell us what they do not want.

Given a new employee possessing specialized skills who is beginning work in an industrial setting, the employer rarely permits him to begin functioning in a capacity which demands the full utilization of his skills. This applies to the semi-skilled, skilled, lower-level and middle-level management positions alike. A kind of apprenticeship or indoctrination into the organization is demanded of the new employee. In a word, he must prove himself and modify his skills to fit the particular working situation. Many of the vocational program graduates are successful in this adaptation process, and often, depending upon their area and degree of specialized skill, adapt more quickly than do others who have not taken vocational training at senior high school. But it is only a short time before the two persons with differing degrees of skilled backgrounds reach

the level of skill demanded by the employer. There is a need, however, to look further along this continuum--as the two persons begin to move up in the organizational structure, the vocational program graduate is soon left behind (unless through a self-study or by some other means, he has continued his general education--and fortunately this is often done). This has serious implications for those of us who provide even the best possible vocational training program. Are we in fact setting a limit on the occupational achievement of students enrolled in our programs?

Industry has an obligation for training and it generally accepts this obligation. But industry views this obligation as one to train their employees in the technical or applicative aspects of the job requirements. Only for the top levels of management does industry consider training programs in the interpretive domain.

Witness the hesitance of industry to become involved with the Job Corp Program. From a profit-motive standpoint, the Job Corp Program is a worthwhile investment returning up to seven percent on their money, with no possibility of a loss. The reasons for industry's reluctance to participate in the Job Corp Program are many, but the basic reason centers on the kind of education needed by the students who are eligible for the program. That is, industry feels competent in the applicative area of training, but is reluctant to become associated with an interpretive and social area of training. They consider the latter to be public education's responsibility. I believe that it would be a good thing for industry to become involved with the socialization aspect and attitudinal development of young adults, but this is not the place to pursue that topic; rather the point to be made here is that industry does not consider itself competent to conduct the interpretive tasks of the educational process and is reluctant to do so, but

is prepared and competent to conduct the applicative tasks of education. Vocational training programs in the senior high school, however, attempt to do both and are not successful in either.

If we are to seriously consider eliminating vocational education programs from secondary school curriculums, and I agree with Professor Broudy that such a consideration is in order, then consideration must also be given to the implications this would have for education at the secondary school level.

Professor Broudy tells us that "general education, if it is successful, lays the necessary groundwork for all high-grade applicative uses of knowledge." He tells us further that "the applicative use of knowledge is prized in Western culture above all others." If such is the case then, to have the secondary school curriculum almost totally interpretive and with little emphasis on the applicative seems illogical. But perhaps Professor Broudy, rather than suggesting that the applicative aspect of understanding be delayed until the completion of the interpretive, would suggest that they be in combinations of varying proportions for students who develop understandings in different ways. To divorce the one from the other, and to precede the one with the other in all situations presupposes a hierarchy which we know does not exist in all situations. It is to this point that I would like Professor Broudy to speak during the discussion period.

If it is suggested that the teacher of the "academic, bookish" subjects include applicative appects of their areas in the curriculum, then a major problem confronts us. Teacher education programs at universities are "academic and bookish" in their approach—in most cases the applicative aspects of the subjects are not taught because they are not known. As a

result, we would be expecting the impossible from secondary school teachers if they were charged with the responsibility of applying their disciplines to the world of work or the productive enterprise. Drastic revisions in teacher education programs would be necessary to make such an approach effective. For example, today's school avoids the problem by delegating the applicative responsibility to after-hours school "clubs."

I mentioned at the beginning of this paper that vocational educators were reluctant to examine and question the postulates of vocational education. Professor Broudy has forced us to consider the issue, and I believe that we would be remiss if we failed to respond. The arguments and justifications presented in the paper of our first speaker at this seminar have provided us with a matrix into which the arguments and justifications of the following speakers can be located.

Comments on Professor ~~Stern's~~ Broudy's
"Problems and Prospects in Vocational Education"

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Addressing a group of vocational educators has certain advantages over addressing a group of general common educators. I would be remiss (particularly as I consider myself a vocational educator) if I were not to avail myself of such advantages. Because of their extensive experience and concern for applicative matters, vocational educators bring a rich background of concrete experience to bear on the interpretive contexts in which they find themselves. A speaker, addressing them finds a sympathetic experiential base which is conducive to his use of analogy and example. In recognition of this potential asset, I have elected to introduce my remarks with an analogy.

You have probably all heard of Pittsburgh Plate Glass Company's color dynamics approach. According to this concept, facilities and equipment are painted specific colors and shades, depending on the function and location of the machine component or structural element. Thus, for machines, the base or body is usually painted green, operator's handles are yellow, moving parts are cream colored, and electrical switches and buttons are painted red. I am told that when the orientation of the facility is considered as it relates to natural light, these colors may be varied in shade according to scientifically determined standards. The color dynamics approach is designed to provide a safe, pleasant, and efficient working environment.

At the other end of the continuum of sophisticated color variability and availability is the Henry Ford approach to the Model T. "You can have any color you want, so long as its black!"

Professor Broudy, in his paper, has also advanced a color dynamics concept. It falls between that of the Pittsburgh Plate Glass Company, and the late Henry Ford. The Broudian color dynamics approach tells us that in curriculum you can have any color you want so long as it is either black or white. In the design of educational programs there are no greys and certainly no reds, yellows, or creams. Despite the fact that I, personally, have an impairment in this area, I submit that such a severely limited visual environment is unduely austive.

The bone of contention, of course, in Dr. Broudy's dualistic conception of general or common education and vocational education. The former is fundamentally interpretive while the latter is essentially applicative. This is, of course, an age-old argument. What is general educati on? Sometimes I feel that the introduction of this term is the most unfortunate calamity that has occurred in the history of education. Perhaps, like the Soviets, we should go through all of our history books and textbooks, and delete all reference to general education. While it may have conveyed some accurate meaning in an earlier age, devoid of educational color and diversity, it has become increasingly disfunctional in a world that provides educational packages in "...25 colors and 20 sizes..."

If by general education we mean those school subjects that have a high degree of potential applicability across a broad range of human concerns, we must acknowledge that some understandings are more general than others. If you will permit the pun, how uniform are the generals? We have 5 star

generals who may serve as chiefs of staff, and we have 1 star generals who may exercise command over a large military training establishment. Similarly, there are school subjects that are powerful and ubiquitous generalizers, and others that are relative by weak and restricted in scope.

The potency of these general understandings not only varies from one discipline to another, but it also varies in time within the discipline. Thus, while rhetoric would at one time have been placed near the top of anyone's list of the most general of all general education subjects, the advent of the scientific age has most certainly shuffled the deck. It is acknowledged by some, that a discipline is like a living organism. It has a modus vivendi, rules of behavior, procedures for reproduction, and an environment in which to live and grow. What is not so frequently acknowledged is that like living organisms, the disciplines have life and death (or at least-transformation) cycles. From the point of view of educational strategy, these cycles must be carefully observed. In the absence of evidence to justify the anticipation of a metamorphoses, signs of disciplinary senility must be taken as advance warnings to curriculum workers.

But all is not "death and transfiguration" where the disciplines are concerned. We recognize that knowledge is dynamic and that new disciplines are aborning. It seems to me that we can force them to lie in the Procrustean Bed of the traditional disciplines, thereby distorting the normal course of their growth; we can, like the ancient Greeks engage in disciplinary genocide; or hopefully we can relieve the structure so as to provide creative and innovative ways of integrating the emerging disciplines. Let us take the discipline of Psychology, as an example. In terms of the stresses and strains of contemporary society, what body of knowledge has more to offer in the cause of mental health. In what manner, and to what degree is it

included in the common learnings which are provided for growing youngsters? Obviously, its inclusion in educational programs at the elementary and secondary levels has been more surveptitious and fortuitous than overt and systematic.

I am not here primarily to make a plea for the establishment of pre-collegiate courses in psychology, astronomy, anthropology or sociology, although I am suggesting that forthright provision should be made for integrating these and other bodies of knowledge into the curriculum. My primary concern in responding to Professor Broudy's presentation is to point out that all educational levels have a responsibility to assist the student in integrating the interpretive with the applicative through the judgemental or valuative. I submit that he must learn <u>to do</u>, while at the sametime learning to understand. Spare us from a generation that understands everything, and can do nothing (except those applications appropriate to their increasingly narrow field of specialization).

In my view learning experiences should continually oscillate among the interpretive, the applicative, and the valuative. Dr. Broudy's recommendation to defer all vocational education until the post-secondary educational levels suggests an approach to estate planning. We are advised to accumulate our assets (Interpretive knowledge) and to place them in a safe deposit box until we are ready to apply them. Like frozen assets during an inflationary period, I suspect that their value will have been considerably diminished by the time we get around to using them. Innumerable examples of such erosion of the value of interpretive knowledge could be drawn from recent developments in the sciences.

If the traditional disciplines are not absolute or ultimate sources of content in general education, knowledge of application (or vocational education)

is similarly not necessarily the ultimate in specialized education. As many of you already know, research is presently underway at the American Institutes for Research, at the Massachusetts Institute of Technology, Science Research Associates and elsewhere to develop curricular patterns for generalized vocational skills. Many of us in the field of vocational education feel quite strongly that these efforts will not flounder because the two terms are mutually contradictory. While I would agree completely with P ofessor Broudy that highly specialized vocational education is inappropriate at the secondary level, I feel that there is a very strong need for programs of a general vocational nature particularly for adolescents N w it is possible for us to quibble over whether these programs are exploratory or truly vocational, general or specialized. Such quibbling it seems to me, obscures the issue. These are learning experiences that all youngsters should have, and curriculum innovators should bend their efforts toward the development of programs that provide them. If curriculum workers persist in dichotomizing the color spectrum into black and white, life's rainbow of shades and hues will be lost to the coming generations.